

When Immigrants Design for Natives

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Fifteen years ago I answered a survey on technology and its associated implications on teaching and learning. One of the questions asked: "What has been the greatest technological achievement since the printing press?" One of the options to choose from was *the computer*. I picked *the computer*. Several years later, I answered a similar survey on technology and its associated implications on teaching and learning. One of the questions asked: "What has been the greatest technological achievement since the printing press?" This time I selected a new option – *the internet*. While I am sure there will be a similar survey in the near future, I wonder what the options will be this time. Perhaps the next survey will have a new option to select from: something like *wearable electronics, wireless energy, ubiquitous computing*, or something else. Whichever the *new* option might be is not critical. What is critical, however, is the ease at which the learner can become fluent using the technology; whether the learner can use the technology to engage information-age fluencies; and whether the learner engages in these fluencies in the classroom. When our students enter our classroom doors they must encounter environments that foster information-age fluency. It is our job to design such instruction. Contemporary technologies such as Web 2.0 can serve as catalysts for assisting teachers in creating environments where learners engage information-age fluencies.

Information-age Fluencies

The information-age is centered on information exchange, customization, collaboration, networking, holism, and team-based organization (Reigeluth, 2003) - the so called information-age fluencies. According to Ian Jukes (2007), information-age environments have eight essential characteristics. In information-age environments learners: (1) Demonstrate initiative by critically assessing problems & implementing creative solutions; (2) Behave cooperatively as a member of a team; (3) Read for information & application; (4) Calculate & measure for information and application; (5) Behave in a responsible manner without supervision; (6) Communicate verbally & in writing to evoke clear understanding; (7) Seek

excellence in individual & group activities; and (8) Locate & manage resources for problem solving. The learning environments that we create must also reflect these information-age fluencies. This requires a paradigm shift from content-centered design to process-centered design; from teacher-centered instruction to learner-centered instruction; and from digital-immigrant design to digital-native design.

Digital Natives & Digital Immigrants

If you were born into an environment where a particular technology was present (e.g., computer, internet, cell phone, mps player, etc...), then it is more than a technology, it is a tool for you. You are fluent. You are a digital native (Prensky, 2001). Conversely, if you were born into an environment without a given technology, then it is still just a technology to you, not a tool. In this case, you are a digital



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immigrant (Prensky, 2001). Whether you consider yourself a digital immigrant or a digital native, the world in which our children live - *the information age* - requires them to be digital natives. Learning in these environments requires efficient, effective, and collaborative engagement in ill-structured problems (see table below for examples) that are situated in complex, real-world contexts. Surviving and thriving in this environment requires that learners engage information-age fluencies.

Designing Information-age Environments

In order to effectively design information-age environments that engage information-age fluencies, a paradigm shift must occur. The instructional design must steer away from content-centric, discipline-centric, and standards-centric approaches to approaches that emphasize information-age process skills. Such environments require learner engagement in ill-structured problems that are situated in complex, real-world contexts. Several learning theories effectively describe the learning process in a way that is congruent with the information-age fluencies. For instance, learning models such as Problem Based Learning (PBL) (thecasefiles.org, 2005); Discovery Learning (Bruner, 1961); and Experiential Learning (Kolb, 1984) (see Table 1 below) describe how to integrate information-age fluencies into learning environments. While these models are not inherently "new" (e.g., they are based on Dewey, 1938), they do include many elements that are now referred to as *information-age fluencies*. And while none of these theories can be considered the grand universal theory, each could be used as a "good fit" for designing instructional environments which engage learners in information-age fluencies.

Getting There

There are three essential elements that must be employed in the design of instructional environments which engage learners in information-age fluencies. The instructional design must incorporate an appropriate instructional

model, center on ill-structured, complex, real-world scenarios or problems, and utilize existing information technologies (e.g., web 2.0) to facilitate integration of appropriate information sources, learning activities, and support structures (e.g., scaffolds, heuristics) to guide the learners through the instruction.

Choosing an Instructional Model

First, you need an instructional model which describes the learning process in a way that is congruent with the aforementioned information-age fluencies. For instance, one of the information-age fluencies is that learners "demonstrate initiative by critically assessing problems & implementing creative solutions." This fluency would be congruent with several phases of the aforementioned learning theories. For instance, PBL's situation, problem analysis, and proposal phases would engage learners in critically assessing and implementing creative solutions (see *PBL example below - Get the Lead Out*). This is also true of Discovery Learning's observe, reflect, abstract, and experiment phases. Similarly, the Experiential Learning model's watching, thinking, and doing phases would engage this information-age fluency.

Ill-structured problems, situated in real-life contexts

The second essential element for creating a learning environment where learners engage information-age fluencies is to create or find ill-structured, complex, real-world scenarios or problems onto which content standards can be aligned. This is critical as the instruction that you create will center on these ill-structured "problems." Examples of ill-structured problems are presented in Table 2 (following page) and in the *PBL example - Get the Lead Out*.

Web 2.0 Technologies to Facilitate

Creation of Information-age Environments

The third essential element for creating a learning environment where learners engage information-age fluencies is to utilize Web 2.0 technologies to facilitate the integration of appropriate information sources, learning activities (e.g.,

Table 1. Problem-based Learning, Discovery Learning, and Experiential Learning

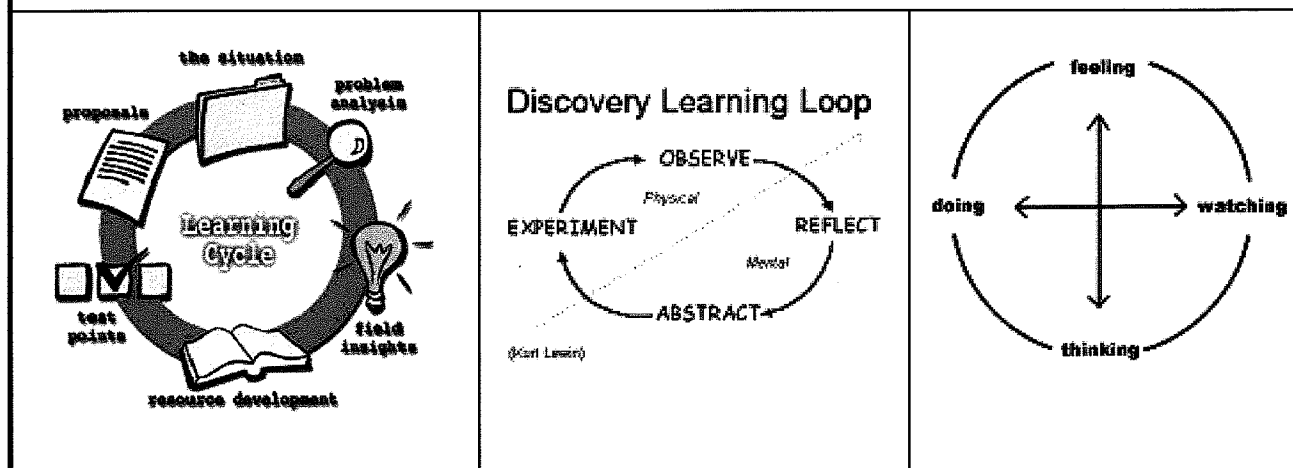


Table 2. Well-structured vs. Ill-structured problems (King, & Kitchener, 1994)

Well-structured	Ill-structured
<ul style="list-style-type: none">• Converting a unit of measure between its English and metric equivalents• Solving for X in an algebraic equation• Calculating the trajectory of a rocket's flight	<ul style="list-style-type: none">• Determining what really happened at the Hue massacre in Vietnam• Judging the adequacy of a theoretical proposition• Predicting how to dispose of nuclear waste safely

Gardner's Multiple Intelligences; Bloom's revised taxonomy), and support structures (e.g., scaffolds, heuristics) to guide learners through the instruction. There are several applications which have been documented to be useful in assisting teachers in the creation of learning environments which center on ill-structured problems situated in complex contexts. Many of these examples are considered Web 2.0, in that they allow the learners to actively engage and collaborate in the process of creating digital products which represent learning progress. Examples include, WebStart pages, WikiSpaces, WebLogs (Blogs), Assessment tools, Podcasting & Screencasting Tools, Video, Photo, and Drawing Applications; Presentation tools; Simulations & Games. For a detailed explanation of these tools see Table 3. Regardless if you are a native or an immigrant, these tools are easy and free.

Thus far this discussion has focused on the abstract, theoretical constructs of information-age environments, and the ways in which they can be created. To further make sense of how these constructs apply to practice the following example is provided.

Overview

Over the duration of two weeks, I created an interactive learning space titled "Get the Lead Out" using existing Web 2.0 technologies to engage learners in information-age fluencies. This environment centers on an ill-structured problem, and was created for a high school chemistry class. Although this example is specific to chemistry or environmental science, the essential elements of this environment could be applied to other "disciplines" and age levels. The Web 2.0 technologies utilized to create this environment were wikispaces, web-based spreadsheets, web-based word-processing, web-video, and audio, all of which are "free" and highly usable. While a brief explanation of this environment is described below, it is recommended that the online activity be accessed at <http://gettheleadout.wikispaces.com>.

Design and Development of the "Get the Lead Out" Learning Environment

Step 1: Select an appropriate instructional model.

The instructional model I chose for this example was PBL,

one of the aforementioned models which incorporates many of the information-age fluencies. The learning sequence according to the model selected here occurs in six phases (see Table 1): the situation, problem analysis, field insights, resource development, test points, and proposals.

Step 2: Select, or create an ill-structured problem which is situated in a complex scenario.

For this case I found a news paper article from the Rocky Mountain News titled: *High lead levels found at three additional sites -Hospital buildings on Fitzsimmons campus are affected.* I then developed real-life and complex scenarios which were presented to learners through the progression of the PBL instructional sequence. I created fictitious but realistic characters and roles which were used to situate the learning and solving of ill-structured problems. *Problem introduction/background.*

"The case investigates a medical facility that is suspected to have elevated lead levels in the water supply. The scenario is that the student over-views an analytical laboratory that has been hired to investigate whether or not a medical facility has elevated lead levels in the water supply. Water samples are collected and analyzed and the analytical lab will make a decision about what to do next. If elevated lead levels are found, the lab will need to prescribe treatment recommendations. The case finishes with a final analysis of the lab's treatment plan in terms of its effectiveness." From <http://gettheleadout.wikispaces.com>.

Step 3. Facilitating the creation of information-age learning environment via web 2.0 technologies.

Creation of the Learning Environment

I used a wikispace to create the "Get the Lead Out" learning environment. The rationale behind this was that wikispaces can effectively and easily integrate information resources from outside and inside the learning environment. They are free to use and provide instructors with controls over access and membership. They can also be used to warehouse relevant resources (e.g., files, videos, assessments, etc...) which will be accessed by learners. Furthermore, wikispaces provide collaboration tools in the form of discus-

sion boards, allowing the instructor to easily track access history. Learners can also extend the wikispace environment through the creation of their own spaces and pages.

Creation of the Scenarios

There were three consecutive scenarios which were presented to learners in the "Get the Lead Out" Case. Because one of the goals of the information-age environments is to situate learning in realistic and complex scenarios, I decided to create short 1-2 minute videos which presented the scenarios in a realistic fashion with fictitious characters and roles. The videos were created using the Web 2.0 tool "jump cut." The videos were integrated into the wikispace. Learners would view the videos and make decisions about what the next steps would be to address the scenarios. After each scenario was presented, learners would then follow the PBL learning cycle. Learners would analyze each scenario and document their analysis using a scaffold. They would conduct field insights and access resources to further explore, describe and address the given scenario. This was followed by a proposal phase, whereby learners would prepare short presentations of how they proposed to address the scenario.

Summary

So while we may not know for certain what the next technology will be, we know that the world in which our children live and learn demands engagement in information-age fluencies. And while the digital immigrants may not be completely comfortable designing instruction for the digital natives it can be done. It can be done by utilizing appropriate inquiry learning theories (e.g., PBL, discovery learning, and experiential learning). It can be done by centering instruction on ill-structured problems that are situated in complex, real-

world contexts. It can be done by utilizing Web 2.0 technologies to facilitate, scaffold, support, and guide our learners through environment foreign to the immigrants and home to the natives.

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Pelican Dreaming

Later he would walk down to the lagoon
to look for the pelicans. They were
his touchstone, the way their
solid bodies gave substance to the
landscape, a centre to it. Only when
they found him would he return.

—Mark Young

Mark Young is a New Zealander who has lived in Australia for more than half his life. He's the editor of Otoliths & also publishes books under the same imprint. Currently he's filling out the last few pages of his Selected Poems, 1959-2008. Its working title is Pelican Dreaming.